

CAMERA CALIBRATION USING OFF-AXIS ILLUMINATION
AND VIGNETTING EFFECTS

ABSTRACT OF THE DISCLOSURE

An imaging device is calibrated using a flat, featureless surface and uniform illumination, relying on the effect of off-axis illumination and vignetting on the reduction of light into the camera at off-axis angles. The effect of the tilt of the camera is also considered. These effects are used to extract intrinsic camera parameters including focal length, principal point, aspect ratio and skew.

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Figure 1 consists of 12 bar charts, labeled (a) through (l), each representing a different demographic or attitudinal variable. Each chart displays the percentage of respondents for that variable across four time points: 1992, 1996, 2000, and 2004. The variables are as follows:

- (a) Age: 18-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75+.
- (b) Sex: Male, Female.
- (c) Education: Less than high school, High school, Some college, College, Graduate school.
- (d) Income: Less than \$10,000, \$10,000-\$19,999, \$20,000-\$29,999, \$30,000-\$39,999, \$40,000-\$49,999, \$50,000-\$59,999, \$60,000-\$69,999, \$70,000-\$79,999, \$80,000-\$89,999, \$90,000-\$99,999, \$100,000+.
- (e) Marital status: Single, Married, Divorced, Widowed.
- (f) Religion: Protestant, Catholic, Jewish, Muslim, Other.
- (g) Political affiliation: Democrat, Republican, Independent.
- (h) Party affiliation: Democrat, Republican, Independent.
- (i) Party identification: Democrat, Republican, Independent.
- (j) Party loyalty: Democrat, Republican, Independent.
- (k) Party support: Democrat, Republican, Independent.
- (l) Party preference: Democrat, Republican, Independent.

In all charts, the 1992 and 1996 bars are dark grey, the 2000 bar is light grey, and the 2004 bar is white. The y-axis for all charts represents the percentage of respondents, ranging from 0 to 100.